

Applicant: Jacob et al.
Application No.: 09/763,980

Claims 1-3 were also objected to as including a few minor informalities. These have been addressed by the above amendments. Accordingly, withdrawal of the objections to claims 1-3 is respectfully requested.

Claims 1-4 were rejected under 35 U.S.C. §103 as unpatentable over U.S. Patent 3,792,725 to Asberg in view of U.S. Patent 4,699,527 to Hutzal. Asberg is cited as disclosing a differential having a bevel-pinion shaft supported by two angular-contact ball bearings. The Examiner admits that Asberg does not disclose the bearings as double-row bearings and cites Hutzal as disclosing similar angular-contact bearings with a double row construction. Applicants respectfully traverse this rejection.

As amended, claim 1 now recites that the first tandem angular-contact ball bearing that is positioned next to the bevel-pinion of the bevel-pinion shaft is larger than the second bearing. This is neither suggested nor disclosed by Asberg, which discloses single row ball bearings of the same size. Hutzal, which is only directed to bearing assemblies does not suggest or disclose a differential, and the combination of Hutzal and Asberg does not address this. Accordingly, Applicants respectfully submit that claim 1 is patentable over the combination of Asberg and Hutzal and withdrawal of the section 103 rejection of claim 1 is respectfully requested.

Claims 2-4 and 6 depend from claim 1 and should be patentable over this combination for the same reasons as noted above in connection with claim 1.

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Claim 5 was rejected under 35 U.S.C. §103 as unpatentable over Asberg in view of Huztel, further in view of Hampp, W. "Walzlager - Berechnung und Gestaltung". The Hampp publication is cited as disclosing a differential assembly utilizing roller bearings, with the bearing adjacent to the bevel gear being larger than the second bearing. The Examiner concludes that this combination would render the subject matter of claim 5 obvious. Applicants respectfully traverse this rejection. To the extent that claim 5 has been incorporated into claim 1, Applicants will address this rejection with respect to claim 1.

Claim 1 is directed to a differential for a motor vehicle in which two spaced apart axially pretensioned angular-contact ball bearings are provided for the bevel-pinion, with the angular-contact ball bearings being unilaterally loadable double-row tandem angular-contact ball bearings. The first bearing positioned adjacent to the bevel-pinion is larger than the second bearing. This arrangement provides reduced costs as well as reduced wear which amounts to about 1/10 of the wear of the prior solution known according to Hampp, as described in paragraphs 6 and 7 of the specification. Conical roller bearings, by definition, develop sliding friction between the rollers and the races which results in increased wear along the surfaces of the bearing rings which leads to wear of the conical rollers. This ultimately results in the loss of pretension in the bearing and an increase in play between the bevel-pinion and the ring gear. To the

extent that the conical roller bearings of Hampp wear in a totally different manner than spherical roller bearings, there is nothing that would suggest to a person of ordinary skill in the art that a spherical roller bearing could be used to replace a conical roller bearing or that spherical roller bearings of different sizes would be necessary or desirable. While Asberg discloses the use of roller bearings, there is no suggestion or disclosure that these should be double-row tandem angular-contact ball bearings with one piece inner and outer races or that the first angular-contact ball bearing positioned next to the bevel-pinion should be larger than the second bearing in a differential. If anything, Asberg teaches away from this combination since Figure 4 discloses that the bearing located closest to the bevel pinion (49) is actually smaller in diameter than the outer bearing (48) in this case, or are the same size, as shown in the other examples. Accordingly, there would be no suggestion to a person of ordinary skill in the art to combine Hampp with Asberg based on the apparently contrary teachings. With respect to Hutzler, there is no suggestion or disclosure of using different sized angular-contact ball bearings in a differential in this reference. Accordingly, it is respectfully submitted that claim 1 is patentable over this combination and withdrawal of this rejection is respectfully requested.

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If the Examiner believes that any additional minor formal matters need to be addressed in order to place this application in condition for allowance, the Examiner is invited to contact the undersigned by telephone at the Examiner's convenience.

In view of the foregoing amendment and remarks, Applicants respectfully submit that the present application, including claim 1-4 and 6, is in condition for allowance and a notice to that effect is respectfully requested.

Respectfully submitted,

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37 CFR §1.121 CLAIM AMENDMENTS
MARKED UP VERSION

1. (Amended) Differential for a motor vehicle with a bevel-pinion shaft (5) which is supported in a drive housing (1) by two spaced and axially pretensioned angular-[connect] contact ball bearings and which, through a bevel pinion (4) and a ring gear (6), drives a differential unit (2) mounted in the drive housing (1), axle shafts (9) being supported in the differential unit (2) which are operationally connected with each other via output gears (8) and differential gears (7), [**characterized in that**] wherein the angular-contact ball bearings are [designed as] unilaterally loadable double-row tandem angular-contact ball bearings (16,17) which each include a one piece inner bearing race (18) and a one piece outer bearing race (19) and which face each other in an O-arrangement, and the first tandem angular-contact ball bearing (16) positioned next to the bevel pinion (4) of the bevel-pinion shaft (5) is larger than the second bearing (17).

2. (Amended) Differential according to Claim 1, [characterized in that] wherein the races of the bearings (16,17) have [the same or] a different diameter.

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3. (Amended) Differential according to Claim 1, [characterized in that] wherein the races of [that] the bearings (16,17) have [the same or] a different pressure angle.

4. (Amended) Differential according to Claim 1, [characterized in that] wherein the bearing balls (22,23) of both races of the bearings (16,17) are guided in cages (24) and have [the same or] a different diameter.

6. (Amended) [Differential] Differential according to Claim 1, [characterized in that] wherein the inner ring (18) of the second double-row tandem angular-contact ball bearing (17) is supported in an axial direction against a deformable sleeve (25).